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7.14 Method Used To Calculate Potential Loss Figures

1. In **Broadwater County**, the median value of a housing unit is \$85,500. Structure losses were determined by overlaying the hazard area on the structure data to determine the number of structures that lie within that hazard area. The number of structures in the hazard area was multiplied by \$85,500. In most cases, the dollar values are multiplied by a damage factor since many events will not result in a complete loss of all structures. Population impacts were qualitatively assessed based on the percentage of population estimated to have residences in the hazard area and the general warning time that could be expected (Big Sky Hazard Management).

In **Park County**, the median value of a housing unit is \$97,900. GIS data was used if available (structures have been mapped in 50% of the County) along with the Montana Dept. of Revenue's Computer Assisted Mass Appraisal System.

In **Deer Lodge County**, the median value of a housing unit is \$70,700. GIS data was used if available along with Montana Dept. of Revenue's Computer Assisted Mass Appraisal System.

In **Granite County**, the median value of a housing unit is \$78,300. GIS data was used with hazard areas in risk assessments.

In **Silver Bow County**, the median value of a housing unit is \$74,900. GIS data was used with hazard areas in risk assessments.

In **Garfield County, Rosebud County and Treasure County**, structure replacement value and contents values data from the county, town insurance records or taxable values were used. Population impacts were qualitatively assessed based on the number of structures estimated to be in the hazard area. An average of 1.9 people per structure reside in Garfield County, an average of 2.6 people per structure reside in Rosebud County, and an average of 2.8 people per structure reside in Treasure County.

In **Powder River County**, the median value of a housing unit is \$59,800. Where possible, GIS data allowed comparison of the resources to hazard areas. When not available, estimation and plausible scenarios to quantify potential losses were used.

Population estimates were based on the average number of people per structure. A population of 1,858 divided by 857 structures equals 2.2 people per structure.

2. In **Judith Basin, Golden Valley, Musselshell, and Wheatland counties**, building and societal exposures were calculated by overlaying the hazard area on census block data. Building exposure values were based on building stock data available from the FEMA HAZUS software. To allow analysis of building stock values at the census block level, the building stock structure values were assigned to census blocks in the same proportion that a given block represents the percentage of population in the tract. To calculate societal exposure, six variables from the 2000 Census were used. They include population density, age greater than 65, age less than 18, income less than poverty level, no high school and population with disabilities. For each census block, the six vulnerabilities were added and divided by six. Building and societal risk was then calculated by multiplying Exposure x Frequency (times per year) x Hazard Loss Magnitude (% of assets or population affected by event). This method was also used for **Blaine, Daniels, Hill, Lake, Phillips, Roosevelt, Sanders, Sheridan, and Valley counties** and the **Blackfeet, Flathead, Fort Belknap, Fort Peck, Rocky Boys tribal reservation** plans. [Tetra Tech and Rick Gould].
3. In **Big Horn, McCone, Prairie, Richland and Wibaux counties and the Crow and Northern Cheyenne Reservation**, potential loss estimates were assessed as follows:
 - a. Identify the future potential for the hazard to result in damages. This was done by looking at past occurrences and considering factors that could potentially increase risk. Analysis focused on existing land uses.
 - b. Inventory assets and identify what might be affected by the different hazard events. Critical facilities and vulnerable populations were identified at the first steering committee meeting.
 - c. Estimate losses. Losses were estimated using information from past events (Cossitt Consulting).
4. In **Fergus County**, human and economic impact were calculated. Human impact was rated on a scale of 1 to 10 with 1 being very little chance of injuries or deaths related to the event and 10 being a very good chance of injuries or deaths. Economic impact was rated in a similar way; 1 designated very little economic impact and 10 designated very serious economic impact (Lacey M. Bray).
5. In **Beaverhead County**, hazard vulnerability assessments were calculated with the following formula:

Frequency x Magnitude x Exposed = Potential Risk Factor/Involvement Per Year

Frequency is how often an event occurs in a year (based on historical records). An impact area was then designated for each hazard and a magnitude was assigned. The magnitude represents the percentage of the population and structures to be affected by the hazard event. Exposed refers to people or dollar value of structures. Values for structures were based on the County Assessors reports (Mel Rice, PDM Planner).

6. In **Lewis and Clark County**, GIS data was used to determine potential \$ losses for flood, earthquake and wildfire. Potential loss equals the sum of all house values within a designated hazard area. For flood, the hazard area is the 100-year flood. For wildfire, homes in the "High" to "Severe" wildfire areas were totaled. For earthquake, the city of Helena was examined.
7. **Madison County** used the guidelines in the FEMA document *Understanding Your Risk: Identifying Hazards and Estimating Losses* to develop a cost estimate for earthquake damage. For Hazmat, a traffic accident in the town of Ennis (intersection of US hwy 287 and MT hwy 287) was postulated. The number of people associated with nearby businesses and schools was totaled for societal risk.
8. **Flathead County** presented risk assessments based on history and estimated vulnerabilities to the community. Some hazards have estimates of dollar losses and population impacted whereas others are more qualitatively assessed based on available information from the risk assessment process.

Dawson County also presented risk assessments based on history (Cossitt and Beck Consulting). **Fallon County** and **Carbon County** also used this method (Beck Consulting).

Stillwater County presented risk assessments based on a hypothetical hazard event. Reasonably consequences were identified for each of the events and experts on costs for the consequences were contacted for dollar estimates based on previous local experiences.

9. **Lincoln County** presented scores of 1 (Low), 2 (Medium) and 3 (High) for societal impact depending on the potential for loss of life or human health impacts. Property loss potential was rated as 1-4:

- 4 - >\$50 million
- 3 - \$10-\$50 million
- 2 - \$1-\$10 million
- 1 - <\$1 million

These values were calculated based on number and type of structures potentially impacted by a hazard event multiplied by the Severity rating multiplied by an average value for structures or infrastructure. The Lincoln County Assessor provided an estimate of the average residential unit value of \$100,000. Commercial blocks were valued at \$2 million (Hydrometrics, Inc and Arrowhead Engineering).

10. **Mineral County, Missoula County** and **Ravalli County** calculated societal and building loss estimates by various methods. The HAZUS Earthquake model, Montana CAMA data, FEMA Flood Loss Estimation and historic losses were used to calculate estimates (Land & Water Consulting, Inc.)

Powell County used a similar method for estimating losses; they looked at historic data and the Montana CAMA data. Building and Societal impacts were rated as Low, Medium and High.

11. **Liberty County** and **Toole County** estimated hazard losses using information from past events. Losses were estimated as high, medium or low:

Low = <\$500,000

Medium = \$500,001 to \$2.5 million

High = >\$2.5 million

Societal risk was also rated as low, medium or high:

Low= Sporadic impacts on individual properties

Medium= Significant impact locally

High= Half or more of the county's population is significantly impacted (Beck Consulting).

12. **Carter County** LEPC prepared their PDM. They estimated potential loss for the hazards as low, moderate or high. **Gallatin County** also estimated potential loss for hazards as low, moderate or high.

13. **Custer County** only calculated potential loss for their major hazards which includes drought and flood. County participants also rated the consequences of an average hazard event for drought, flood, wildfire, winter storm and wind storm/hail as low, moderate or high:

Low= No serious injury or loss of human life, damage is less than \$500,000.

Moderate= Loss of human life and/or damage between \$500,000 and \$3 million.

High= Multiple lives lost and/or damage greater than \$3 million.

Petroleum County presented an inventory of assets but did not present potential dollar losses per hazard. Inventory includes the following:

County Courthouse and contents - \$1,024,000

County Maintenance Shop and contents - \$100,000

Two ambulances - \$46,250

Sheriff's vehicles - \$71,500

Fire Dept. vehicles - \$300,000

Road Dept. vehicles - \$99,717

Weed Dept. - \$7,225

Large road equipment - \$250,283

In 1997, the average farm in Petroleum County was 6,152 acres, valued at \$1,110,237 with an average cost per acres of \$188.

Jefferson County and **Sweet Grass County** also presented tables of an inventory of assets but did not present potential dollar losses per hazard.

Glacier County and **Pondera County** presented a figure with estimated building stock values by census block but did not present potential dollar losses per hazard.

Teton County presented a list of critical facilities but did not provide dollar values or potential loss estimates (Northwest Mangement, Inc.)

Yellowstone County used the FEMA publication *Understanding Your Risk: Identifying Hazards and Estimating Losses* to estimate loss; however, they did not look at the hazards and estimate the effect of a hazardous event.